BSEE

Bureau of Safety and Environmental Enforcement

UNITED STATES DEPARTMENT OF THE INTERIOR

BSEE FPSO Regulatory Review Process

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Emerging FPSO Forum

September 26 - 27, 2012

emerging FPSO forum

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FPSOs in the GOM

- Petrobras Cascade/Chinook
  - DWOP approved August 18, 2009
  - Approved for production March 17, 2011
  - 180 miles off LA coast, host in WR Block 249
  - 8,300 feet WD
  - Turret moored, disconnectable
  - Free standing hybrid risers
  - Subsea pumps
- Shell Stones (future)
  - Conceptual DWOP Approved April 24, 2012
  - 200 miles from N.O., host in WR Block 551
  - 9,500 feet WD
  - Turret moored, disconnectable
  - Steel lazy wave risers
  - Future subsea pumping

BW Pioneer - Petrobras America

GOM, Walker Ridge Area

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Record of Decision (ROD) for the Environmental Impact Statement (EIS)

- FPSO Record of Decision
  - Signed December 13, 2001.
  - Recommendation and decision document approved the concept of FPSO in the Gulf of Mexico.
  - Does not constitute approval of any specific FPSO project.
  - Summarizes findings from the EIS and other considerations (CRA, regulations).

FPSO EIS Parameters

- Western and Central Planning Areas
  - No FPSO in USCG lightering-prohibited areas
- ≥ 650 feet WD
- Ship-shaped doubled-hulled FPSO
- 1,000,000 bbls crude storage capacity divided into 10 storage tanks
- Permanent, internal turret mooring system
  - Not in EIS: disconnectable turret

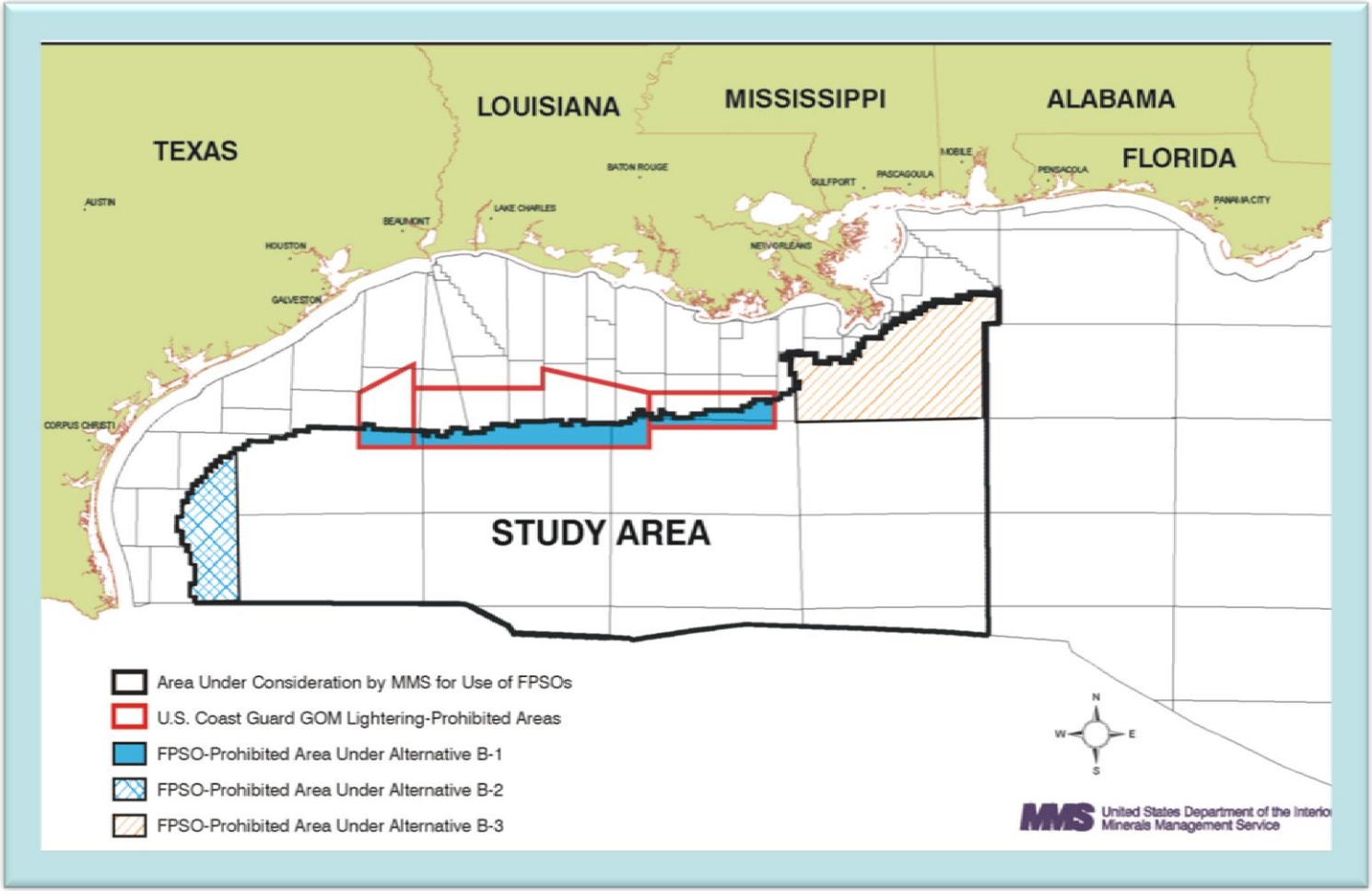
FPSO EIS Parameters

- Subsea systems: wells, flowlines, umbilicals, manifolds and risers are the same as other existing deep water projects.
  - Not in EIS: Free Standing Hybrid Risers (FSHR)
- Production and processing facilities: same as other existing deep water projects.

FPSO EIS Parameters

- Gas transported to shore by pipeline
  - No gas flaring
- Oil transported to shore by shuttle tanker
  - 500,000 bbls capacity limit
  - Jones Act vessel (USCG)
  - Doubled-hulled shuttle tanker
  - Transport crude to Gulf coast ports or Louisiana Offshore Oil Port
  - USCG lightering prohibited areas (USCG)
    - Title 33 CFR Subchapter O, Part 156

FPSO EIS Parameters



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BSEE FPSO Applications

- Development Operations Coordination Document (DOCD)
  - Submitted to BOEM Plans Section before conducting any development or production operations on your lease.
  - 30 CFR 250.241 - 262, NTL 2008-G04
- Deep Water Operations Plans (DWOP)
  - Submitted to BSEE TAS for deep water projects or any project that utilizes new technology.
  - 30 CFR 250.286 - 295

BSEE FPSO Applications

- BSEE Permits and Applications
  - 30 CFR 250.802(e) Production Safety System Application (District)
  - 30 CFR 250.904 Platform Approval Program Application (OSTS)
  - 30 CFR 250.909 Platform Verification Program (OSTS, TAS, Pipeline)
  - 30 CFR 250.1007 Pipeline Application (Pipeline Section)
  - 30 CFR 250.410 Application for Permit to Drill (District)
  - 30 CFR 250.513 Application for Permit to Modify (District)
  - Other permits, plans, or applications as required

The DWOP Process

- TAS evaluates the complete operations for a proposed project in deep water or that utilizes new technology, with respect to the intent of the regulations.
- Conceptual Plan and DWOP
- Anatomy of a DWOP Approval
  - Description and scope of project
  - Status of identified departures or alternate compliance procedures
  - Valve closure schedule and timing for abnormal conditions and valve testing frequencies
  - OSTS and PD requirements and reminders
  - TAS conditions of approval

DWOP Considerations

- Doubled-hulled, ship-shaped or other shaped vessel (USCG & BSEE)
- Amount of oil storage in hull
- Oil and gas transportation to shore
- Moored turret system (BSEE & USCG)
- Subsea systems (BSEE)
- Production and processing facilities (BSEE)
  - American standards organizations: API RP 14C, API RP 500 & 505, API RP 14F & 14FZ, ASME, etc.

DWOP Considerations

- TAS will not recommend a permanently moored FPSO

- Why? Hurricanes Ivan, Katrina, and Rita
  - 120 Platforms Destroyed
  - 76 Platforms Extensively Damaged
  - 10 Jackup Rigs Destroyed
  - 24 Jackup and Semisubmersible Rigs Adrift
  - 10 Deepwater Platforms Damaged
  - 861 Wells Destroyed

DWOP Considerations

- FPSO Moored via a Disconnectable Turret Buoy
  - Has been approved in GOM
- Dynamically Positioned (DP) FPSO attached to a Disconnectable Turret Buoy
  - Has not yet been approved for GOM FPSO, but approved for GOM FPU
- Disconnectable FPSO must be able to move under its own power
  - Hull Cleaning & Vessel Service (USCG)
  - Oil Storage & Hurricane Damage (BSEE)

DWOP Considerations

- Turret and Buoy
  - Must be disconnectable
    - Disconnect with or without power
    - Disconnect at an approved significant wave height, H_s, to prevent excessive stresses on the turret, buoy, and release mechanisms. This may vary based on site specific met-ocean conditions.
    - Disconnect without oil discharge to the environment
  - Must be able to weathervane
  - Must have redundant shut-down valves on the FPSO and dual barriers that remain with the turret buoy

DWOP Considerations

- FPSO moored via the Turret Buoy
  - Define conditions that will require a disconnect
    - **Planned Disconnect Timing:** must show the FPSO can disconnect and move out of the path of a known storm or other known environmental event
    - **Emergency Disconnect Timing:** must show the FPSO can disconnect and move out of the path of a sudden storm or other emergency situation
  - Function test semi-annually, not to exceed 6 months
    - Not an actual disconnect
  - BSEE (or USCG) may require a complete disconnect yearly

DWOP Considerations

- DP FPSO attached to a Turret Buoy
  - Must be a class 2 DP vessel at minimum
  - Must define conditions that will require a disconnect
  - Must define watch circle for automatic emergency disconnect
    - **Planned Disconnect Timing**: must show the FPSO can disconnect and move out of the path of a known storm or environmental event
    - **Emergency Disconnect Timing**: must show the FPSO can disconnect without an environmental release for a DP FPSO drive off event
  - Function test and disconnect
    - Test requirements are the same as for turret moored
    - BSEE (or USCG) may request annual test

DWOP Considerations

- FPSO Moored to the Turret Buoy
  - Dual barriers on the vessel, eg. 2 BSDVs.
  - 2 Bubble-tight valves that remain with the buoy after disconnection.
  - 1 Riser Isolation Valve (RIV) on the FSHR, at the base of the riser.

- DP FPSO
  - Dual barriers on the vessel.
  - 2 Bubble-tight valves that remain with the buoy after disconnect, eg. 2 QC/DC Valves or RIVs.

DWOP Considerations

- Subsea shut-downs for ESD, TSE, PSHL and process upset are covered in NTL No. 2009-G36.
- Subsea shut-downs for FPSO disconnect: all BSDV, USV, SCSSV, RIV, QC/DC must close before disconnect.
- Testing frequencies will be specified for required valves.

DWOP Considerations

- FSHR safety requirements
  - Redundant tether chains connecting the buoyancy can to the top of the riser.
  - Monitoring the motion of the top of the riser and the motion of the buoyancy can.
  - Actuated Riser Isolation Valve (RIV) at the base of the riser.
  - FPSO, shuttle tanker, and other vessels must never pass over the top of the FSHR's buoyancy can.
- Policy is currently being drafted on this topic.

Other BSEE Considerations

- Pipelines Section
  - Recommend discussing design pressure and pipeline testing procedures with the BSEE Pipeline Section before completing design.
  - Turret buoy flexible jumpers (for FSHR configuration) must be rated for the MAOP.
  - NTL No. 2009-G28
    - Departure for external hydrostatic pressure for pipeline design pressure (API RP 1111)
    - Departure to determine the MAOP at the BSDV based on the MASP (See NTL No. 2012-N01)

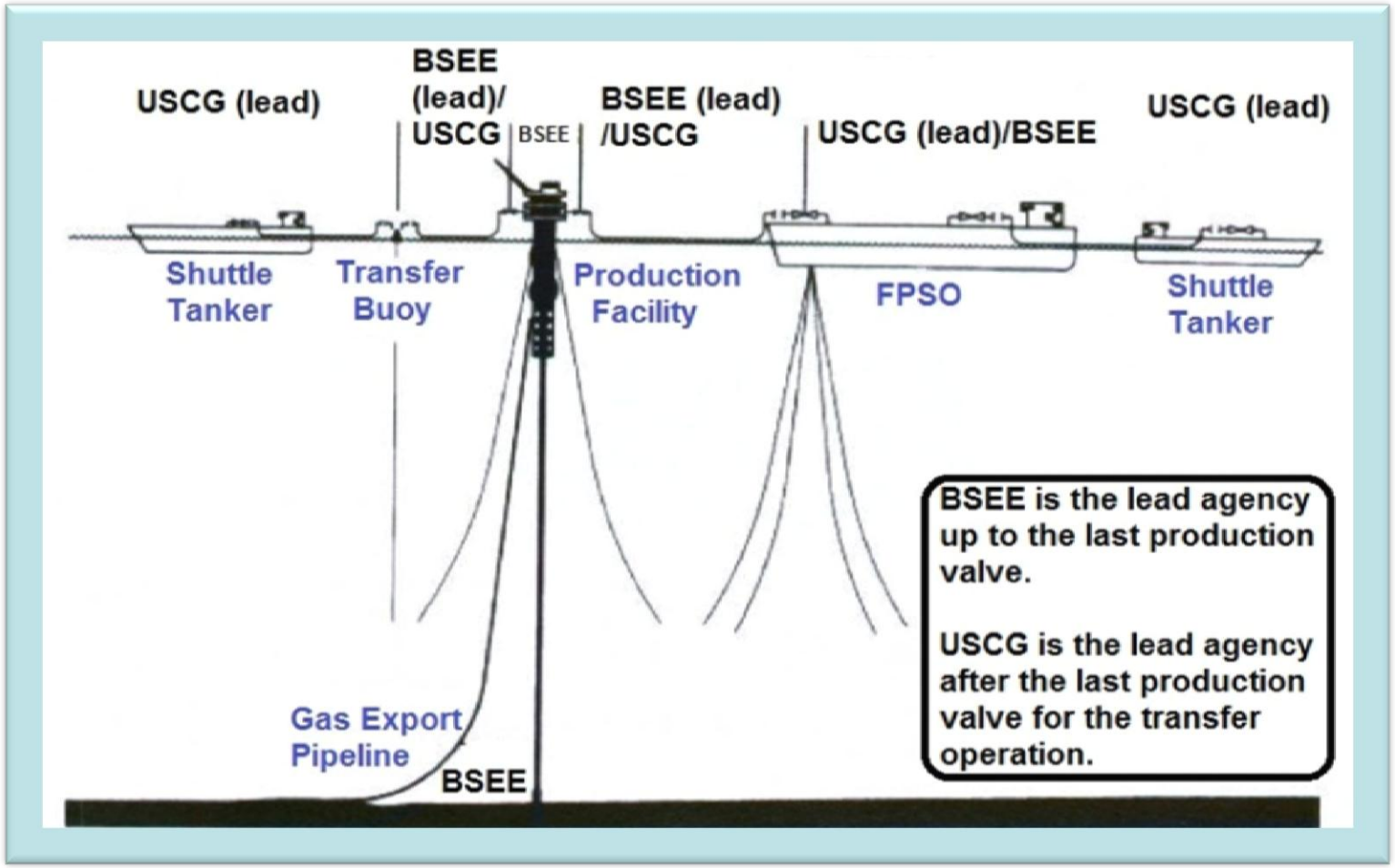
Other BSEE Considerations

- Platform Verification Program, 30 CFR 250.909 - 250.918
  - CVA Reports
    - Design, Fabrication, and Installation
  - Drilling, workover, hybrid well risers, and mooring (TAS)
    - See NTL No. 2009-G03
  - Pipeline and pipeline risers (Pipeline Section)
  - Suction piles, turrets, and floating facilities (OSTS)

DWOP Considerations and USCG Authority

- USCG Regulations
  - Title 33 CFR Subchapter N, Parts 1-199
- Transfer of oil from the FPSO to the shuttle tanker
- ESD for oil transfer operations
- The FPSO vessel and oil storage
- Vessel DP systems
- Mooring systems (shared by BSEE)

DWOP Considerations and USCG Authority



Floating Offshore Facilities MOA between MMS and USCG, February 28, 2008 [modified]

QUESTIONS ?

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Thank You

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